All India Test Series (2023-24)

Test Code: ANY/08

AITS TEST - 08

YAKEEN NEET

DURATION: 200 Minutes | **DATE: 17/04/2024** | **M. MARKS: 720**

Topics Covered

Physics:	Full Syllabus.
Chemistry:	Full Syllabus.
Botany:	Full Syllabus.
Zoology:	Full Syllabus.

General Instructions:

1. Immediately fill in the particulars on this page of the test booklet.
2. The test is of **3 hours 20 minutes** duration and the Test Booklet contains **200** multiple choice questions (four options with a single correct answer) from **Physics, Chemistry and Biology (Botany and Zoology)**. **50** questions in each subject are divided into **two sections (A and B)** as per details given below:
   (a) **Section A** shall consist of **35 (Thirty-five)** Questions in each subject (Question Nos. – 1 to 35, 51 to 85, 101 to 135 and 151 to 185). All Questions are compulsory.
   (b) **Section B** shall consist of **15 (Fifteen)** questions in each subject (Question Nos. – 36 to 50, 86 to 100, 136 to 150 and 186 to 200). In section B, a candidate needs to **attempt any 10 (Ten)** questions out of **15 (Fifteen)** in each subject.
   Candidates are advised to read all 15 questions in each subject of Section-B before they start attempting the question paper. In the event of a candidate attempting more than ten questions, **the first ten questions answered by the candidate shall be evaluated.**
3. There is only one correct response for each question.
4. Each **correct** answer will give **4 Mark** while **1 Mark** will be **deducted** for a **wrong** answer. The maximum marks are 720.
5. No student is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, any electronic device, etc. inside the examination room/hall.
6. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator on duty in the Room/Hall. However, the candidates are allowed to take away this Test Booklet with them.

OMR Instructions:

1. Use blue/black dark ballpoint pen.
2. Darken the bubbles completely. Don't put a tick mark or a cross mark where it is specified that you fill the bubbles completely. Half-filled or over-filled bubbles will not be read by the software.
3. Never use pencils to mark your answers.
4. Never use whiteners to rectify filling errors as they may disrupt the scanning and evaluation process.
5. Writing on the OMR Sheet is permitted on the specified area only and even small marks other than the specified area may create problems during the evaluation.
6. Multiple markings will be treated as invalid responses.
7. **Do not fold or make any stray mark on the Answer Sheet (OMR).**

Name of the Student (In CAPITALS): _____

Roll Number: _____

OMR Bar Code Number: _____

Student's Signature: _____ Invigilator's Signature _____

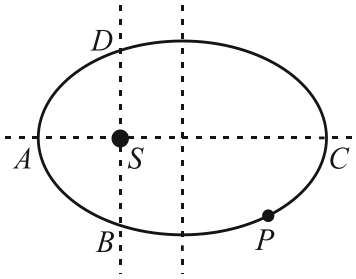
(PHYSICS)

SECTION-A

1. A football is moving towards north in the horizontal plane at constant speed u. After experiencing a kick, it moves with same speed towards west. What is the direction of average acceleration of the football?

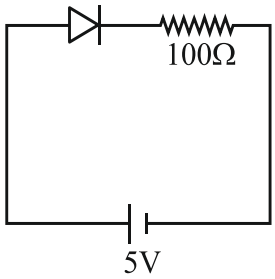
(1) Along north-east
(2) Along south-west
(3) Towards south
(4) Towards east

2. A planet (P) is moving in elliptical path with sun (S) at one of the foci as shown below. If the time taken by the planet to move along DAB is T_1 and along BCD is T_2, then which of the following relation is **correct**?



(1) $T_1 = T_2$
(2) $T_1 > T_2$
(3) $T_1 < T_2$
(4) Cannot be determined

3. Find the current through the battery if the diode has a barrier potential of 0.5 V.



(1) 45 mA
(2) 55 mA
(3) 40 mA
(4) 50 mA

4. 27 identical small metallic spheres are melted and then solidified to make a bigger sphere. If the capacitance of each small sphere is C then what is the capacitance of the bigger sphere?

(1) $6C$ (2) $9C$
(3) $2C$ (4) $3C$

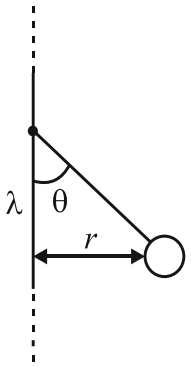
5. A lift of mass 2000 kg is moved using an ideal string. What will be the ratio of tension in string when the lift is accelerated upwards and the tension in string when lift is accelerated downwards with same magnitude of acceleration a? (Take $g = 10\ m/s^2$, $a = 2\ m/s^2$)

(1) $\frac{2}{3}$ (2) $\frac{3}{2}$
(3) $\frac{1}{2}$ (4) $\frac{2}{1}$

6. The time period of a simple pendulum is T. The mass of the bob is doubled, and the length is made four times. The new time period of simple pendulum will be:

(1) $2T$
(2) $2\sqrt{2}T$
(3) $4T$
(4) $3T$

7. A ball having positive charge Q is suspended using an inextensible string to an infinite line charge with linear charge density λ as shown below. If the mass of the ball is m and acceleration due to gravity is g, then find the angle (θ) made by the string in equilibrium. (At equilibrium the ball is at a distance r from the wire and K is electrostatic constant)



(1) $\theta = \tan^{-1}\left(\frac{2K\lambda Q}{mgr}\right)$
(2) $\theta = \tan^{-1}\left(\frac{mgr}{2K\lambda Q}\right)$
(3) $\theta = \sin^{-1}\left(\frac{2K\lambda Q}{mgr}\right)$
(4) $\theta = \cos^{-1}\left(\frac{2K\lambda Q}{mgr}\right)$

8. A ball is dropped on a floor from some height. After collision with the floor, the ball reaches 75% of its initial height. The coefficient of restitution for the collision is;

(1) $\frac{3}{4}$ (2) $\frac{1}{4}$

(3) $\frac{\sqrt{3}}{2}$ (4) $\frac{1}{2}$

9. For a series *LCR* ac circuit, the power factor at resonant condition is;

(1) Zero (2) One

(3) Infinite (4) Two

10. Find the dimensional formula of Planck's constant.

(1) $[ML^2T^{-2}]$

(2) $[ML^{-1}T^{-1}]$

(3) $[MLT^{-1}]$

(4) $[ML^2T^{-1}]$

11. A needle of length 5 cm is floating on water. If the surface tension of water is 0.072 N/m, what is the additional force required to pull the needle out of the water?

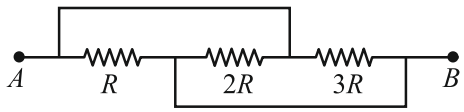
(1) 7.2×10^{-2} N

(2) 7.2×10^{-3} N

(3) 7.2×10^{-1} N

(4) 3.6×10^{-3} N

12. Three resistors are connected as shown in figure. Find the equivalent resistance between the points *A* and *B*.



(1) $\frac{6R}{11}$ (2) $\frac{11R}{6}$

(3) $\frac{3R}{11}$ (4) $6R$

13. The area of parallelogram represented by the vectors $\vec{A}=2\hat{i}+3\hat{j}$ and $\vec{B}=\hat{i}+4\hat{j}$ is;

(1) 14 unit

(2) 7.5 unit

(3) 10 unit

(4) 5 unit

14. An engine pumps up 100 kg of water through a height of 10 m in 5 s. If the efficiency of the engine is 60%, find out the power of the engine (g = 10 m/s^2)

(1) 2 kW (2) 3.33 kW

(3) 1.2 kW (4) 4 kW

15. A proton and an α-particle are initially at a distance '*r*' apart. Find the KE of α-particle at large separation after both particles are released from rest (charge on proton is *e* and *K* is electrostatic constant)

(1) $\frac{3}{5}\frac{Ke^2}{r}$ (2) $\frac{4}{5}\frac{Ke^2}{r}$

(3) $\frac{1}{5}\frac{Ke^2}{r}$ (4) $\frac{2}{5}\frac{Ke^2}{r}$

16. A flywheel rotates with a uniform angular acceleration. Its angular velocity increases from 20π rad/s to 40π rad/s in 10 seconds. How many rotations did it undergo in this period?

(1) 150 (2) 200

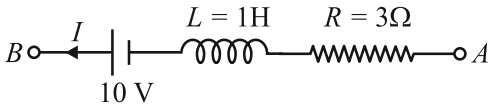
(3) 100 (4) 180

17. 32 gram of oxygen gas at temperature 27°C is compressed adiabatically to $\frac{1}{4}$ of its initial volume. Calculate the change in its internal energy? (γ = 1.5 for oxygen)

(1) – 9977 J (2) + 9977 J

(3) + 4988.5 J (4) – 4988.5 J

18. In the branch AB of a circuit, as shown in the figure, a current $I = (t + 2)$ A is flowing, where *t* is the time in second. At $t = 0$, the value of $(V_A - V_B)$ will be:



(1) –3 V (2) +3 V

(3) –5 V (4) 5 V

19. A cubical block rests on a plane of $\mu = \frac{1}{\sqrt{3}}$. Determine the angle through which the plane must be inclined to the horizontal, so that the block just slides down.

(1) 30° (2) 45°

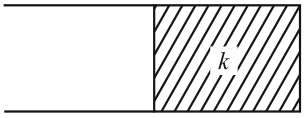
(3) 37° (4) 53°

20. A body of mass 10 kg released from the top of a tower acquires a velocity of 10 m/s after falling through the distance of 20 m. Calculate the work done by the drag force of the air on the body? (Take g = 10 m/s^2)

(1) + 1500 J (2) – 1500 J

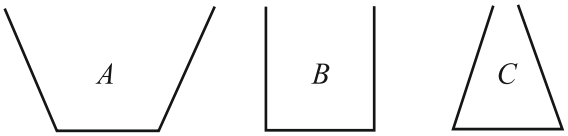
(3) – 500 J (4) + 500 J

21. An air-filled parallel plate capacitor has capacitance C. When a dielectric medium of dielectric constant k is introduced to fill half of the space between the plates as shown, the capacitance becomes $2C$. The value of k is;



(1) 2 (2) 3
(3) 4 (4) 6

22. The three vessels shown in the figure have the same base area. Equal volumes of liquid are poured into the three vessels. The force on the base will be:



(1) maximum in vessel A
(2) maximum in vessel B
(3) maximum in vessel C
(4) equal in all the vessels

23. The coefficient of mutual inductance between two coils depends upon:
(1) medium between coils
(2) separation between coils
(3) orientation of coils
(4) All of these

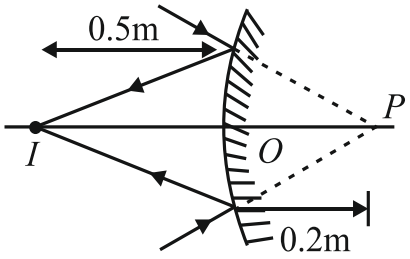
24. The temperature of equal masses of three different liquids A, B and C are 10°C, 15°C and 20°C respectively. The temperature when A and B are mixed is 13°C and when B and C are mixed is 16°C. What will be the temperature when A and C are mixed?

(1) $\frac{14}{11}$°C (2) $\frac{100}{11}$°C
(3) $\frac{70}{11}$°C (4) $\frac{140}{11}$°C

25. Electromagnetic waves are produced by:
(1) charges at rest only
(2) charges in uniform motion only
(3) accelerated or decelerated charges
(4) all of the above

26. Calculate the force required to increase the length of a steel wire of cross-sectional area 10^{-6} m^2 by 0.5%. (Given: Young's modulus for steel = 2×10^{11} N/m^2)
(1) 10^3 N (2) 500 N
(3) 100 N (4) 5000 N

27. A beam of convergent light converges to a point 0.5 m in front of the mirror after reflection at a convex mirror but in the absence of the mirror the beam converges to a point 0.2 m behind the mirror. The radius of curvature of the mirror is;



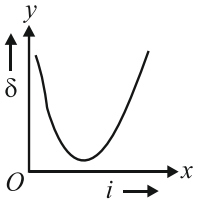
(1) 20 cm
(2) 50 cm
(3) 66.67 cm
(4) 28.57 cm

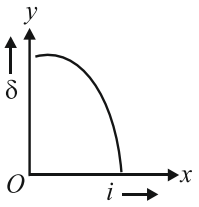
28. The binding energy per nucleon of $^7_3$Li and $^4_2$He nuclei are 5.60 MeV and 7.06 MeV respectively. In the nuclear reaction $^7_3\text{Li} + ^1_1\text{H} \rightarrow ^4_2\text{He} + ^4_2\text{He} + Q$, the value of energy released Q is;
(1) 19.6 MeV
(2) –2.4 MeV
(3) 8.4 MeV
(4) 17.3 MeV

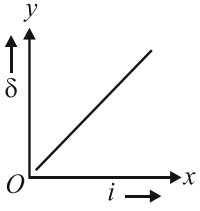
29. A body dropped from top of a tower falls through 40 m during the last two seconds of its fall. The height of tower is; (g = 10 m/s^2)
(1) 60 m (2) 45 m
(3) 80 m (4) 50 m

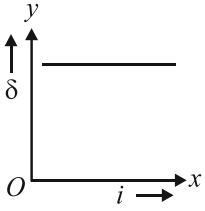
30. Two coherent sources are 0.3 mm apart. They are 1 m away from the screen. The second dark fringe is at a distance 0.3 cm from the center. Distance of fourth bright fringe from the center is;
(1) 0.6 cm (2) 0.8 cm
(3) 1.2 cm (4) 0.12 cm

31. For a prism, graph between angle of deviation (δ) and angle of incidence will be;

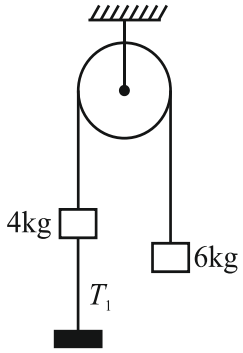
(1) 

(2) 

(3) 

(4) 

32. Two bodies having masses of 4 kg and 6 kg are attached to the ends of a string passing over a pulley. The 4 kg mass is attached to the tabletop by other string. The tension in this string T_1 at equilibrium is equal to: (g = 10 m/s^2)



(1) 10 N (2) 10.6 N
(3) 25 N (4) 20 N

33. A gas for which adiabatic index $\gamma = \frac{5}{3}$ is heated at constant pressure. The percentage of total heat given that will be used for external work is;

(1) 40% (2) 30%
(3) 60% (4) 20%

34. An air column in pipe, which is closed at one end will be in resonance with a vibrating tuning fork of frequency 264 Hz if the length of the column (in cm) is; (speed of sound in air is 330 m/s)

(1) 31.25 (2) 62.50
(3) 110 (4) 125

35. A square plate of side ℓ has mass per unit area μ. Find its moment of inertia about an axis passing through the centre and perpendicular to its plane.

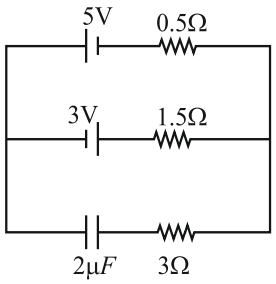
(1) $\frac{\mu\ell^4}{12}$ (2) $\frac{\mu\ell^4}{6}$
(3) $\frac{\mu\ell^4}{3}$ (4) $\frac{\mu\ell^4}{2}$

SECTION-B

36. Two balls A and B having masses 2 kg and 4 kg are placed on the y-axis. If ball A is at point (0, 5), then find the possible coordinates of ball B such that center of mass lies on the y-axis at a distance of 1 unit from the origin.

(1) (0, –1) and (0, –4)
(2) (0, –2) and (0, –4)
(3) (0, –1), and (0, –2)
(4) (0, 0) and (0, –4)

37. Find the charge on the capacitor in steady state in the circuit given below:

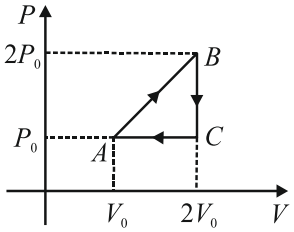


(1) 3μC (2) 2μC
(3) 6μC (4) 4μC

38. Two identical wires under the same tension have fundamental frequency of 600 Hz. Find the percentage increase in tension of any one wire so that a beat frequency of 3 Hz can be obtained using the two wires.

(1) 1% (2) 2%
(3) 3% (4) 4%

39. An ideal gas is taken through a cyclic process $ABCA$ as shown in the PV diagram. Find the ratio of work done in the cycle $ABCA$ to the work done in process CA.



(1) –2 (2) $\frac{1}{2}$
(3) 2 (4) $\frac{-1}{2}$

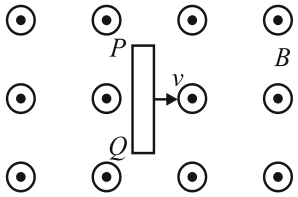
40. **Statement I:** The parallel axis theorem to calculate moment of inertia is applicable for both planar and three-dimensional bodies.
Statement II: The perpendicular axis theorem to calculate moment of inertia is only applicable for planar bodies.

(1) Statement I and Statement II both are correct.
(2) Statement I is correct but Statement II is incorrect.
(3) Statement I is incorrect but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

41. A long wire carrying current I is placed along the +y-axis of a coordinate system. Find the magnitude of magnetic field due to the wire at a point (1m, 1m, 2m).

(1) $\frac{\mu_0 I}{2\pi}$T (2) $\frac{\mu_0 I}{2\pi\sqrt{2}}$T
(3) $\frac{\mu_0 I}{2\pi\sqrt{5}}$T (4) $\frac{\mu_0 I}{\pi\sqrt{5}}$T

42. A neutral conducting rod of length ℓ is moving in uniform magnetic field B with speed v as shown. Which of the following statements is **correct**?



(1) Positive charges accumulate at end P
(2) Positive charges accumulate at end Q
(3) There is no accumulation of charges.
(4) Entire rod becomes positively charged.

43. A light of wavelength 400 nm is incident on a photosensitive material. If the threshold wavelength for the surface is 1127.27 nm, then what is the stopping potential?

(1) 1 V (2) 2 V
(3) 1.5 V (4) 2.5 V

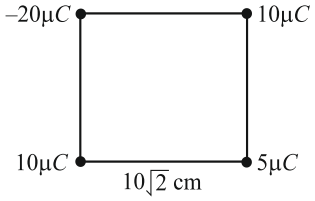
44. Two polaroids are aligned on a straight line such that their optical axis makes an angle of 60° with each other. If light of intensity I_0 is incident on first polarizer then the intensity of light coming out of second polarizer is;

(1) $\frac{I_0}{4}$ (2) $\frac{I_0}{2}$
(3) $\frac{I_0}{8}$ (4) $\frac{I_0}{16}$

45. A spring having spring constant K is cut in two equal parts. These two parts are connected in parallel with a block of mass m. If the block is displaced from mean position, then the time period of oscillation will be:

(1) $2\pi\sqrt{\frac{m}{4K}}$ (2) $2\pi\sqrt{\frac{m}{2K}}$
(3) $2\pi\sqrt{\frac{m}{K}}$ (4) $2\pi\sqrt{\frac{2m}{K}}$

46. Four charges are placed at the corners of a square of side $10\sqrt{2}$ cm as shown below. Find out the electric potential at the center of the square.

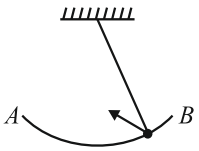


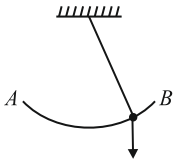
(1) 45×10^5 V (2) 45×10^4 V
(3) 90×10^5 V (4) 90×10^4 V

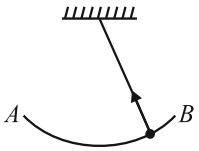
47. A ball is released from rest at height $2R$ above the surface of earth where R is the radius of earth. What is the speed of the ball just before hitting the surface? (g is acceleration due to gravity on the surface.)

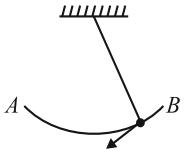
(1) $\sqrt{\frac{2gR}{3}}$
(2) $\sqrt{\frac{gR}{3}}$
(3) $\sqrt{\frac{4gR}{3}}$
(4) $\sqrt{\frac{5gR}{3}}$

48. A pendulum is oscillating between two extreme positions A and B. At any intermediate position which option gives the **correct** representation of the acceleration vector?

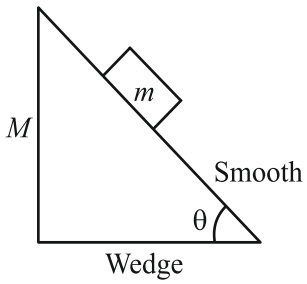
(1) 

(2) 

(3) 

(4) 

49. What horizontal acceleration should be provided to the wedge so that the block of mass m kept on wedge remains at rest w.r.t. wedge?



(1) g tanθ towards right
(2) g tanθ towards left
(3) g cotθ towards right
(4) g cotθ towards left

50. Two projectiles are projected at complimentary angles to the horizontal with same speed 20 m/s. One of them rises 10 m higher than the other. Find the angles of projection. (Take g = 10 m/s^2)

(1) 20° and 70°
(2) 37° and 53°
(3) 15° and 75°
(4) 30° and 60°

(CHEMISTRY)

SECTION-A

51. Select equations having exothermic step;
(I) $S^-(g) + e^- \rightarrow S^{2-}(g)$
(II) $Na^+(g) + Cl^-(g) \rightarrow NaCl(s)$
(III) $N(g)+e^- \rightarrow N^-(g)$
(IV) $Al^{2+}(g) \rightarrow Al^{3+}(g)+e^-$
Choose the **correct** code;
(1) II (2) I, II
(3) III, IV (4) II, III

52. Covalent compounds have low melting point than ionic compounds because;
(1) Covalent molecules have definite shape
(2) Covalent bond is weaker than ionic bond
(3) Covalent bond is less exothermic
(4) Covalent molecules are held by weak vander waals force of attraction.

53. Select the **correct** order of boiling point;
(1) $PH_3 < AsH_3 < NH_3 < SbH_3$
(2) $NH_3 < PH_3 < AsH_3 < SbH_3$
(3) $PH_3 < AsH_3 < SbH_3 < NH_3$
(4) $PH_3 < NH_3 < AsH_3 < SbH_3$

54. Select the option which involve weak vander waals force between molecules;
(1) $Xe+H_2O$ (2) Ethanol+H_2O
(3) Liquid He (4) Liquid HCl

55. How many gram of glucose must be present in 0.5 L of solution for its osmotic pressure to be the same as that of 9.2 g of glucose per litre?
(1) 4.6 g (2) 5.8 g
(3) 3.6 g (4) 8.4 g

56. In Reimer Tiemann reaction dichlorocarbene acts as
(1) Nucleophile (2) Electrophile
(3) Free radical (4) All of these

57. Which of the following is **not** oxidised by O_3?
(1) KI (2) $FeSO_4$
(3) $KMnO_4$ (4) K_2MnO_4

58. Which of the following has the minimum heat of dissociation ?
(1) $[(CH_3)_3N \rightarrow BF_3]$
(2) $[(CH_3)_3N \rightarrow B(CH_3)F_2]$
(3) $[(CH_3)_3N \rightarrow B(CH_3)_2F]$
(4) $[(CH_3)_3N \rightarrow B(CH_3)_3]$

59. Al_4C_3 on hydrolysis gives gas X. How many H atoms are present in molecule X?
(1) 3 (2) 2
(3) 4 (4) 1

60. Number of atom present in 5.6L of O_2 gas at S.T.P is;
(1) N_A
(2) $2N_A$
(3) $\frac{N_A}{2}$
(4) $\frac{3}{2}N_A$

61. If x is the F–Xe–F adjacent bond angle in XeF_4. Find x;
(1) 90º (2) 180º
(3) 120º (4) 45º

62. If the magnetic moment of $[NiX_4]^{2-}$ is found to be zero. then the metal of the complex ion is–
[X=Monodentate anionic ligand]
(1) sp^2 hybridized
(2) sp^3 hybridized
(3) dsp^2 hybridized
(4) sp^3d^2 hybridized

63. All of the elements of the Boron group form trihalides except;
(1) B (2) Ga
(3) In (4) Tl

64. Which of the following halogen on reaction with water liberates O_2?
(1) Cl_2 (2) F_2
(3) I_2 (4) Br_2

65. The overall order of reaction between X and Y is 3. Which of the following rate equation must be **correct**, if on doubling the concentration of X, the rate of reaction gets doubled?
(1) $r = K[X]^2[Y]^0$ (2) $r = K[X]^1[Y]^2$
(3) $r = K[X]^1[Y]^3$ (4) $r = K[X]^2[Y]^1$

66. Which of the following element does **not** show allotropy?
(1) P (2) As
(3) Sb (4) Bi

67. A certain current liberates 0.500 g of H_2 in 2.00 hr. How many gram of oxygen can be liberated by the same current in the same time?

(1) 0.500 g (2) 8.00 g
(3) 4.00 g (4) 16.00 g

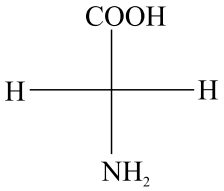
68. Which of the following compound contain amide linkage?

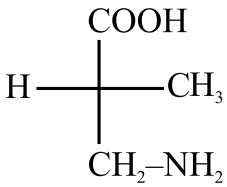
(1) Fructose (2) Proteins
(3) Glucose (4) Acetic acid

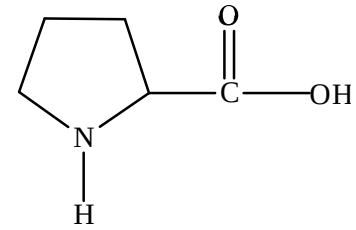
69. **Correct** statement among the following is;

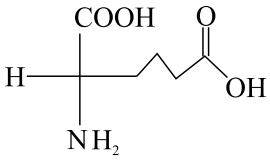
(1) Hydrolysis of picryl chloride requires higher temperature than chlorobenzene.
(2) Tertiary amine give Heinsberg test.
(3) Phosgene is a poisonous gas.
(4) Nucleophilic aromatic substitution in nitrobenzene occurs at meta position.

70. Which of the following is **not** an α–amino acid?

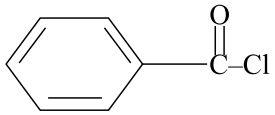
(1) 

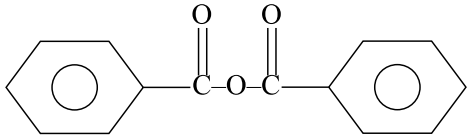
(2) 

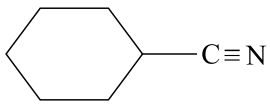
(3) 

(4) 

71. Which of the following compound on hydrolysis yield a carboxylic acid?

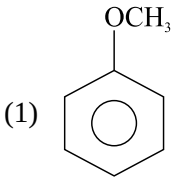
(1) 

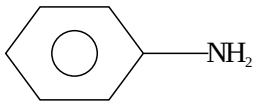
(2) 

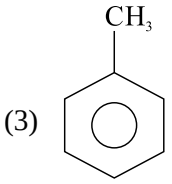
(3) 

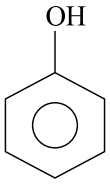
(4) All of these

72. Which of the following compounds do **not** give Friedel craft reaction?

(1) 

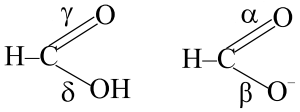
(2) 

(3) 

(4) 

73. Stability of dihalide of Si, Ge, Sn and Pb increases as follows -

(1) $GeX_2 < SiX_2 < SnX_2 < PbX_2$
(2) $SiX_2 < GeX_2 < PbX_2 < SnX_2$
(3) $SiX_2 < GeX_2 < SnX_2 < PbX_2$
(4) $PbX_2 < SnX_2 < GeX_2 < SiX_2$

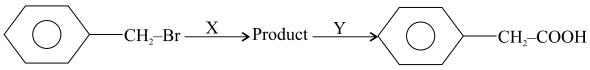
74. 

(I) (II)

(C – O) bond length designated by α,β, γ and δ are in order;

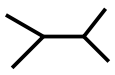
(1) $\gamma < \alpha = \beta < \delta$
(2) $\alpha < \gamma = \beta < \delta$
(3) $\delta < \alpha = \beta < \gamma$
(4) $\delta < \gamma = \alpha < \beta$

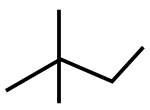
75. Identify the set of reagents in the reaction condition X and Y in the following set of transformation;

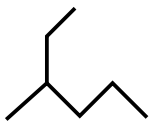


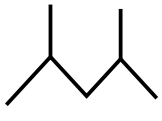
(1) X = NaCN, Y = (i) OH^-/H_2O (ii) H_3O^+
(2) X = Mg/Et_2O, Y = CO_2, followed by H_3O^+
(3) Both (1) and (2)
(4) X = alcoholic KOH, Y = (i) HCN (ii) H_3O^+

76. Which among the following compounds is optically active?

(1) 

(2) 

(3) 

(4) 

77. Which one of the following reaction would produce secondary alcohol?

(1) $CH_3-\overset{\overset{O}{\|}}{C}-CH_3 \xrightarrow[(II)\ Br_2]{(I)\ OH^-}$

(2) $C_6H_5-\overset{\overset{O}{\|}}{C}-CH_3 \xrightarrow[(II)\ H_2O]{(I)\ LiAlH_4}$

(3) $CH_3-CHO \xrightarrow[(II)\ H_2O]{(I)\ LiAlH_4}$

(4) $CH_3-\overset{\overset{O}{\|}}{C}-CH_3 \xrightarrow[(II)\ H_2O]{(I)\ CH_3MgBr}$

78. In Duma's method for estimation of nitrogen 0.25g of an organic compound gave 40ml of nitrogen collected at 300K temperature and 730 mm pressure. If the aqueous tension at 300K is 30 mm, the percentage of nitrogen in the compound is;

(1) 16.76
(2) 18.20
(3) 17.36
(4) 15.76

79. Arrange the following canonical structures in order of their stability;

(I) $CH_3-\overset{\overset{O}{\|}}{C}-NH_2$ (II) $CH_3-\overset{\overset{O^-}{|}}{C}=\overset{\oplus}{N}H_2$

(III) $CH_3-\overset{\overset{O^{\oplus}}{|}}{\underset{\ominus}{C}}-NH_2$ (IV) $CH_3-\overset{\overset{O^{\ominus}}{|}}{\underset{\oplus}{C}}-NH_2$

(1) III > II > I > IV
(2) I > II > IV > III
(3) I > II > III > IV
(4) IV > III > II > I

80. Which of the following Product is **not** formed in the given reaction?

$CH_3-CH_2-\overset{\overset{O}{\|}}{C}-H + CH_3-\overset{\overset{O}{\|}}{C}-H \xrightarrow[\Delta]{dil.\overset{\ominus}{O}H}$

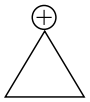
(1) $CH_3-CH_2-CH=\underset{\underset{CH_3}{|}}{C}-CH=O$

(2) $CH_3-CH=CH-CH_2-\overset{\overset{O}{\|}}{C}-H$

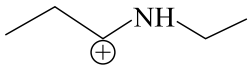
(3) $CH_3-CH_2-CH=CH-CH=O$

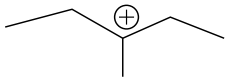
(4) $CH_3-CH=CH-CH=O$

81. **Most** stable carbocation among the following is;

(1) 

(2) $Ph-\overset{\oplus}{C}H_2$

(3) 

(4) 

82. Which of the following oxide react with NaOH?

(1) ZnO (2) B_2O_3
(3) SO_3 (4) All of these

83. Which of the following is **correct** order of energy of atomic orbital for H–atom;

(1) 3d > 4s
(2) 3s < 3p
(3) 2s < 2p
(4) 4s = 4p

84. For a reversible reaction:

$A(s) + 2B(g) \rightleftharpoons 3C(g)$ at any temperature 'T' relation between Kp and Kc is;

$Kc = Kp(RT)^x$, hence value of 'x' will be;

(1) –1 (2) 1
(3) 0 (4) 2

85. For an isothermal expansion of an ideal gas which of the following statement is **correct**?

(1) $\Delta H = 0$
(2) $\Delta E = 0$
(3) Both (1) and (2)
(4) Heat is equal to constant

SECTION-B

86. Ultraviolet region of spectral lines for the spectrum of atomic hydrogen lies is;

(1) Lyman series (2) Paschen series
(3) Pfund series (4) Balmer series

87. $CH_3-\overset{\overset{O}{\|}}{C}-H \xrightarrow[(II)KOH,\ \Delta]{(I)\ N_2H_4} (A) \xrightarrow[hv]{Br_2} (B) \xrightarrow{aq.KOH} (C)$

What is **incorrect** about product C?

(1) (C) gives yellow precipitation with I_2/NaOH
(2) (C) gives silver mirror with tollen's reagent
(3) (C) can also be produce by the reaction HCHO with methyl magnesium bromide followed by hydrolysis.
(4) (C) is used as a solvent in paint industry

88. **Statements I:** Potassium permanganate on heating at 573 K forms potassium manganate.
Statements II: Both potassium permanganate and potassium manganate are tetrahedral and paramagnetic in nature.
(1) Statement I and Statement II both are correct.
(2) Statement I and Statement II both are incorrect.
(3) Statement I is correct, but Statement II is incorrect.
(4) Statement I is incorrect, but Statement II is correct.

89. **Statement I:** The E^o value for Ce^{4+}/Ce^{3+} is +1.74V.
Statement II: Ce is more stable in Ce^{4+} state than Ce^{3+} state in aqueous solution.
(1) Statement I and Statement II both are correct.
(2) Statement I and Statement II both are incorrect.
(3) Statement I is correct, but Statement II is incorrect.
(4) Statement I is incorrect, but Statement II is correct.

90. Match the **List-I** with **List-II** and choose the **correct** option.

List-I Name of oxo acid		**List-II Oxidation state of (P)**	
(A)	Hypophosphorus acid	(I)	+5
(B)	Orthophoshphoric acid	(II)	+4
(C)	Hypophosphoric acid	(III)	+3
(D)	Orthophosphorus acid	(IV)	+2
		(V)	+1

(1) (A)-(IV), (B)-(V), (C)-(III), (D)-(II)
(2) (A)-(V), (B)-(IV), (C)-(II), (D)-(III)
(3) (A)-(V), (B)-(I), (C)-(II), (D)-(III)
(4) (A)-(IV), (B)-(I), (C)-(III), (D)-(II)

91. Which compound is more soluble in an acidic solution than in a neutral solution?
(1) $PbBr_2$ (2) CuCl
(3) AgI (4) BaF_2

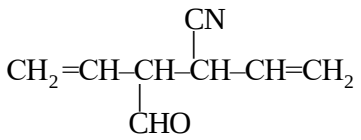
92. Consider the following reaction:
$2\ COF_2(g) \rightleftharpoons CO_2(g) + CF_4(g)$ $K_c = 2.00$ at 1000°C
In an equilibrium mixture, the concentration of COF_2 is 0.25 M and the concentration of CF_4 is 0.11 M. What is the equilibrium concentration of CO_2?
(1) 1.13 M (2) 4.34 M
(3) 0.55 M (4) 2.25 M

93. Which acid would you choose to combine with its sodium salt to make a best buffered solution at pH 4.25?
(1) chlorous acid ($HClO_2$) $pK_a = 1.95$
(2) formic acid ($HCHO_2$) $pK_a = 3.74$
(3) nitrous acid (HNO_2) $pK_a = 3.34$
(4) hypochlorous acid (HClO) $pK_a = 7.54$

94. The change in entropy when 25.0 g of water condenses from a gas to a liquid at the normal boiling point of water (100.00 °C) is nearly.
$\Delta H_{vap} = 40.7$ kJ/mol
(1) +161 J/K (2) –151 J/K
(3) +145 J/K (4) –245J/K

95. Gold can be plated out of a solution containing Au^{3+} according to the half-reaction:
$Au^{3+}(aq) + 3e^- \rightarrow Au(s)$
The mass of gold that can be plated out in 25-minute by 5.5 A current will be?
(Given: Au=197 g/mol)
(1) 1.4 g (2) 2.8 g
(3) 4.2 g (4) 5.6 g

96. The **correct** IUPAC name of the following?



(1) 3-cyano-2-ethenyl pent-4-enal
(2) 2-ethenyl-3-formyl pent-4-ene nitrile
(3) 2,3-diethenyl-4-oxobutane nitrile
(4) 3-cyano-4-formyl hexa-1,5-diene

97. A solution contains 0.102 mol $Ca(NO_3)_2$ and 0.927 mol H_2O. Calculate the vapour pressure of the solution at 55 °C. The vapour pressure of pure water at 55 °C is 118.1 torr. (Assume that the solute completely dissociates.)
(1) 44.8 torr (2) 106.4 torr
(3) 88.8 torr (4) 94.8 torr

98. Crystal field stabilization energy for high spin d^4 octahedral complex is;
(1) $-1.8\Delta_0$ (2) $-1.6\Delta_0 + P$
(3) $-1.2\Delta_0$ (4) $-0.6\Delta_0$

99. Invert sugar is an equimolar mixture of;
(1) D-Glucose and D-Fructose
(2) D-Glucose and L-Fructose
(3) D-Glucose and L-Glucose
(4) D-Fructose and L-Fructose

100. To an aqueous solution containing Al^{3+}, Zn^{2+}, Ca^{2+}, Fe^{3+}, Ni^{2+}, Ba^{2+} and Cu^{2+} ions conc. HCl followed by H_2S is added. The total number of cations precipitated during this reaction is/are;
(1) 1 (2) 3
(3) 4 (4) 2

(BOTANY)

SECTION-A

101. The study of diversity of the living organisms and the relationship between them is called;
(1) classification. (2) systematics.
(3) taxonomy. (4) taxon.

102. Identify the **incorrect** statement.
(1) Cyanobacteria are chemosynthetic autotrophic bacteria.
(2) Chemosynthetic autotrophic bacteria oxidise various inorganic substances such as nitrates, nitrites and ammonia.
(3) Chemosynthetic autotrophs play a great role in recycling nutrients like nitrogen, phosphorous, iron and sulphur.
(4) Heterotrophic bacteria are most abundant in nature.

103. **Assertion (A):** Fusion of two gametes dissimilar in size, as in species of *Eudorina* is termed as anisogamous.
Reason (R): Fusion between one large, nonmotile (static) female gamete and a smaller, motile male gamete is termed oogamous, e.g., *Volvox*, *Fucus*.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

104. Tap root system is found in case of;
(1) *Monstera*.
(2) grass.
(3) mustard.
(4) wheat.

105. Identify the **correct** statement w.r.t dicot stem.
(1) Cortical layers below hypodermis consist of rounded thin-walled sclerenchymatous cells.
(2) The middle layer of the cortex is called the endodermis.
(3) The cells of the epidermis are rich in starch grains.
(4) Epidermis, covered with a thin layer of cuticle, may bear trichomes and a few stomata.

106. Identify the **incorrect** statement.
(1) Schwann studied different types of animal cells and reported that cells had a thin outer layer which is today known as the 'plasma membrane'.
(2) Schwann's studies on plant tissues explain that the presence of cell wall is a unique character of the plant cells.
(3) Schleiden proposed the hypothesis that the bodies of animals and plants are composed of cells and products of cells.
(4) Schleiden, examined a large number of plants and observed that all plants are composed of different kinds of cells which form the tissues of the plant.

107. Identify the following as **true (T)** or **false (F)** statements and choose the **correct** option.
A. Some cells in adult animals do not appear to exhibit division e.g., heart cells.
B. The cells that do not divide further exit G_2 phase to enter an inactive stage.
C. Cells in G_0 stage remain metabolically active but no longer proliferate.
D. The plants can show mitotic divisions in only diploid cells.

	A	**B**	**C**	**D**
(1)	T	T	T	T
(2)	T	T	F	F
(3)	T	F	T	F
(4)	F	T	F	T

108. Match **List-I** with **List-II** to find out the **correct** option.

List-I		**List-II**	
(I)	Cyclic photophosphorylation	(A)	Only PS I is involved
(II)	Non-cyclic photophosphorylation	(B)	PS I and PS II are involved
(III)	C_4 cycle	(C)	First CO_2 fixation by RuBisCO
(IV)	C_3 cycle	(D)	First CO_2 fixation by PEPcase

	I	**II**	**III**	**IV**
(1)	A	B	C	D
(2)	C	A	B	D
(3)	C	D	A	B
(4)	A	B	D	C

109. **Statement I:** The compounds that are reduced during the process of respiration are known as respiratory substrates.
Statement II: ATP acts as the energy currency of the cell.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct but Statement II is incorrect.
(3) Statement I is incorrect but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

110. Match **List-I** with **List-II** to find out the **correct** option.

List-I		List-II	
(I)	Auxins	(A)	Promote adventitious shoot formation
(II)	Gibberellins	(B)	Hastens fruit ripening in tomatoes
(III)	Cytokinins	(C)	Promote apical dominance
(IV)	Ethylene	(D)	Promote bolting in beet

	I	II	III	IV
(1)	B	A	D	C
(2)	B	A	C	D
(3)	C	A	B	D
(4)	C	D	A	B

111. A typical angiosperm anther has _____ lobes and a total of _____ theca.
(1) two; two (2) two; four
(3) four; four (4) one; two

112. **Assertion (A):** Mendel self-pollinated the F_2 pea plants and found that dwarf F_2 plants continued to generate dwarf plants in F_3 and F_4 generations.
Reason (R): It is not possible to know the genotypic composition by simply looking at the phenotype of a dominant trait.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

113. Identify the **incorrectly** matched pair.
(1) hnRNA – Precursor of mRNA
(2) rRNA – Catabolic role during transcription
(3) tRNA – Adapter molecule
(4) snRNA – Transcribed by RNA polymerase III

114. Identify the **incorrect** match.
(1) *Azospirillum* – Free living nitrogen fixing bacteria
(2) *Rhizobium* – Symbiotic nitrogen fixing bacteria
(3) *Glomus* – Symbiotic bacteria forming mycorrhiza
(4) *Oscillatoria* – Nitrogen fixing cyanobacteria

115. **Statement I:** Primary productivity depends on the plant species inhabiting a particular area.
Statement II: Net primary productivity is the available biomass for the consumption to only herbivores.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct but Statement II is incorrect.
(3) Statement I is incorrect but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

116. Plants capture only ___ per cent of the PAR and this small amount of energy sustains the entire living world.
(1) 1-2 (2) 2-10
(3) 10-20 (4) 30-50

117. According to the 'rivet popper hypothesis' explained by Stanford ecologist Paul Ehrlich, airplane is compared to;
(1) ecosystem.
(2) species.
(3) key species.
(4) population.

118. Identify the **correctly** matched pair w.r.t dorsiventral leaf.
(1) Mesophyll – Not differentiated into palisade and spongy parenchyma
(2) Stomata – More on the adaxial surface of epidermis
(3) Vascular bundle – Surrounded by a layer of thick-walled bundle sheath cells
(4) Epidermal cells – Covered by cuticle only on adaxial surface

119. From the following, identify the number of cellular structures that are present only in plant cells compared to animal cells.
Centrioles, chloroplast, chromoplast, mitochondria, golgi bodies, cell wall, cell membrane.
(1) 6 (2) 5
(3) 3 (4) 4

120. Identify the **incorrect** statement from the following.
(1) Meiosis involves two sequential cycles of nuclear and cell division called meiosis I and meiosis II but only a single cycle of DNA replication.
(2) Meiosis I is initiated after the parental chromosomes have replicated to produce identical sister chromatids at the S phase.
(3) Meiosis involves pairing of homologous chromosomes and recombination between sister chromatids of homologous chromosomes.
(4) Four haploid cells are formed at the end of meiosis II.

121. During photorespiration, the reaction between _____ and _____ takes place.
(1) RuBP; CO_2
(2) RuBP; O_2
(3) PGA; phosphoglycolate
(4) PGA; CO_2

122. Out of the following steps of glycolysis, identify the one that leads to NADH + H^+ formation.
(1) Conversion of glucose to glucose-6-phosphate
(2) Conversion of fructose 1, 6-bisphosphate to glyceraldehyde-3-phosphate
(3) Conversion of 2-phosphoglycerate to phosphoenolpyruvate
(4) Conversion of glyceraldehyde-3-phosphate to 1,3-bisphosphoglyceric acid

123. Identify the **incorrect** statement from the following.
(1) The increased growth per unit time is termed as growth rate.
(2) In arithmetic growth, following mitotic cell division, only one daughter cell continues to divide while the other is degenerated.
(3) The simplest expression of arithmetic growth is exemplified by a root elongating at a constant rate.
(4) In the log phase of geometric growth, both the progeny cells following mitotic cell division retain the ability to divide and continue to do so.

124. Match **List-I** with **List-II** to find out the **correct** option w.r.t the structure of pollen grain.

List-I		**List-II**	
(I)	Exine	(A)	Made of cellulose and pectin
(II)	Intine	(B)	Possess germ pore
(III)	Vegetative cell	(C)	Divides to form the male gametes
(IV)	Generative cell	(D)	Contains abundant food reserve material

	I	**II**	**III**	**IV**
(1)	B	A	D	C
(2)	B	A	C	D
(3)	C	A	B	D
(4)	C	D	A	B

125. Identify the **incorrect** statement w.r.t law of segregation.
(1) Alleles do not show any blending.
(2) Both the dominant and recessive characters are recovered as such in the F_2 generation though one of these is not seen at the F_1 stage.
(3) The factors or alleles of a pair segregate from each other such that a gamete receives only one of the two factors.
(4) A homozygous parent produces two kinds of gametes.

126. **Assertion (A):** RNA is unstable as compared to DNA.
Reason (R): RNA being a catalyst is reactive.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

127. If in a forest there were 10 rabbits last year and through reproduction 4 new rabbits are added to the population in a year, calculate the birth rate.
(1) 0.1 offspring per rabbit per year
(2) 0.8 offspring per rabbit per year
(3) 0.2 offspring per rabbit per year
(4) 0.4 offspring per rabbit per year

128. Read the following statements and choose the **correct** option.
A. Endoplasmic reticulum (ER) divides the intracellular space into two distinct compartments, i.e., luminal (inside ER) and extra luminal (cytoplasm) compartments.
B. The endoplasmic reticulum bearing ribosomes on their surface is called rough endoplasmic reticulum.
C. SER is frequently observed in the cells actively involved in protein synthesis and secretion.
D. In animal cells lipid-like steroidal hormones are synthesised in RER.
(1) A and B are incorrect.
(2) B and D are correct.
(3) A and D are correct.
(4) C and D are incorrect.

129. Law of Limiting Factors to explain the effect of various factors on the rate of photosynthesis was explained by;
(1) Blackman.
(2) T.W. Engelmann.
(3) Julius von Sachs.
(4) Cornelius van Niel.

130. Identify the number of **correct** statements from the following w.r.t fermentation.
A. In yeast, the incomplete oxidation of glucose is achieved under aerobic conditions.
B. The enzymes, pyruvic acid decarboxylase and alcohol dehydrogenase catalyse alcohol fermentation.
C. In animal cells, when oxygen is inadequate for cellular respiration, pyruvic acid is reduced to lactic acid by lactate dehydrogenase.
D. Anaerobic bacteria can produce only ethyl alcohol from pyruvic acid through anaerobic respiration.
(1) 1 (2) 2
(3) 3 (4) 4

131. **Statement I:** The majority of flowering plants show bisporic development of embryo sac.
Statement II: A microspore mother cell undergoes meiosis to form four megaspores.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct but Statement II is incorrect.
(3) Statement I is incorrect but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

132. *Antirrhinum* shows inheritance of flower colour by;
(1) co-dominance.
(2) incomplete dominance.
(3) multiple allelism.
(4) complete dominance.

133. All of the following are the regions of transcription unit in DNA, **except**;
(1) a promoter. (2) the structural gene.
(3) an inhibitor. (4) a terminator.

134. The genotype of the individual with O blood group is;
(1) *ii*. (2) I^AI^B.
(3) I^Bi. (4) I^Ai.

135. Identify the sequence of the mRNA if the coding strand of DNA is 5'-ATGCCGAT-3'.
(1) 5'-ATGCCGAT-3'
(2) 5'-AUGCCGAU-3'
(3) 3'-AUGCCGAU-5'
(4) 3'-ATGCCGAT-5'

SECTION – B

136. The male sex organs in bryophytes are _____ and are called _____.
(1) multicellular; antheridia
(2) multicellular; archegonia
(3) unicellular; antheridia
(4) unicellular; archegonia

137. The green expanded part of the leaf with veins and veinlets is called;
(1) leaf base. (2) leaf blade.
(3) petiole. (4) stipule.

138. All tissues on the inner side of the endodermis in dicot stem constitute the _____.
(1) stele
(2) conjuctive tissue
(3) pericycle
(4) pith

139. **Assertion (A):** The detailed structure of the cell membrane was discovered before 1950.
Reason (R): Chemical studies on the cell membrane, especially in human red blood cells (RBCs), enabled the scientists to deduce the possible structure of plasma membrane.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

140. Match **List-I** with **List-II** to find out the **correct** option w.r.t meiosis.

List-I		**List-II**	
(I)	Interkinesis	(A)	Microtubules get attached to the kinetochores of sister chromatids
(II)	Metaphase II	(B)	Followed by prophase II
(III)	Metaphase I	(C)	Microtubules get attached to the kinetochores of homologous chromosomes
(IV)	Prophase I	(D)	Recombination takes place

	I	**II**	**III**	**IV**
(1)	B	A	C	D
(2)	B	C	A	D
(3)	A	D	C	B
(4)	A	D	B	C

141. Identify the **incorrect** statement.

(1) Chemiosmosis requires a membrane, a proton pump, a proton gradient and ATP synthase.

(2) Energy is used to pump protons across a membrane, to create a gradient within the thylakoid lumen.

(3) ATP synthase has a channel that allows diffusion of protons from stroma of chloroplast to thylakoid lumen.

(4) The breakdown of the proton gradient provides enough energy to cause ATP synthesis by ATP synthase enzyme.

142. During Krebs' cycle, substrate level phosphorylation takes place during the formation of;

(1) citric acid.

(2) malic acid.

(3) succinic acid.

(4) fumaric acid.

143. _____ accelerates abscission in flowers and fruits like thinning of cotton, cherry, walnut.

(1) ABA (2) GA

(3) Ethylene (4) Cytokinin

144. Flowers with the exposed anther and stigma are known as;

(1) cleistogamous.

(2) chasmogamous.

(3) syncarpous.

(4) apocarpous.

145. **Statement I:** Henking discovered the X body in insects.

Statement II: It is observed that in a large number of insects the mechanism of sex determination is of the XY type.

(1) Statement I and Statement II both are correct.

(2) Statement I is correct but Statement II is incorrect.

(3) Statement I is incorrect but Statement II is correct.

(4) Statement I and Statement II both are incorrect.

146. Match **List-I** with **List-II** to find out the **correct** option w.r.t *lac* operon.

List-I		**List-II**	
(I)	Gene *i*	(A)	Codes for beta-galactosidase
(II)	Gene *y*	(B)	Codes for permease
(III)	Gene *z*	(C)	Codes for transacetylase
(IV)	Gene *a*	(D)	Codes for repressor protein

	I	**II**	**III**	**IV**
(1)	C	A	B	D
(2)	B	A	C	D
(3)	D	B	A	C
(4)	C	B	A	D

147. **Assertion (A):** The municipal waste-water contains large amounts of organic matter and microbes.

Reason (R): Treatment of waste water is done by the autotrophic microbes naturally present in the sewage.

(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.

(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.

(3) **Assertion (A)** is true, and **Reason (R)** is false.

(4) **Assertion (A)** is false, and **Reason (R)** is true.

148. Mutualism is a type of population interaction in which;

(1) one organism is benefitted and the other is harmed.

(2) one organism is benefitted and the other is neither benefited nor harmed.

(3) both organisms are harmed.

(4) both organisms are benefitted.

149. Identify the following statements as **true (T)** or **false (F)** and choose the **correct** option.

A. Pyramid of energy is always inverted, can never be upright.

B. Each bar in the energy pyramid indicates the amount of energy present at each trophic level in a given time or annually per unit area.

	A	**B**
(1)	T	T
(2)	T	F
(3)	F	T
(4)	F	F

150. **Statement I:** Among animals, insects are the most species-rich taxonomic group, making up more than 70 per cent of the total.

Statement II: More than 70 per cent of all the species recorded are animals, while plants comprise no more than 22 per cent of the total.

(1) Statement I and Statement II both are correct.

(2) Statement I is correct but Statement II is incorrect.

(3) Statement I is incorrect but Statement II is correct.

(4) Statement I and Statement II both are incorrect.

(ZOOLOGY)

SECTION-A

151. Which of the following methods of contraception is characterized by the given statements?

A. Effective only up to a maximum period of six months following parturition.
B. Side effects are almost nil.
C. Chances of failure are high.

(1) Periodic abstinence
(2) Lactational amenorrhea
(3) Vaults
(4) Non-medicated IUDs

152. Select the **incorrect** statement w.r.t. transport of oxygen.

(1) O_2 can bind with haemoglobin in a reversible manner to form oxyhaemoglobin.
(2) Binding of oxygen with haemoglobin is primarily related to partial pressure of O_2.
(3) Each Hb molecule can carry a maximum of six molecules of O_2.
(4) Every 100 ml of oxygenated blood can deliver around 5 ml of O_2 to the tissue under normal physiological conditions.

153. Immunologically competent cells are present in;

(1) rete testis.
(2) interstitial spaces.
(3) seminiferous tubules.
(4) epididymis.

154. 'A' and 'B' belong to phylum 'C' which is characterised by triploblastic and segmented worms. 'A' is marine and dioecious whereas 'B' is terrestrial and monoecious.

Select the **correct** option for **A**, **B** and **C** respectively.

	A	**B**	**C**
(1)	*Hirudinaria*	*Nereis*	Annelida
(2)	*Ancyclostoma*	*Nereis*	Platyhelminthes
(3)	*Aplysia*	*Nereis*	Ascelminthes
(4)	*Nereis*	*Pheretima*	Annelida

155. A gene of interest is inserted at the BamH I recognition site in vector pBR322. To select the recombinants, plating should be done first on;

(1) ampicillin containing medium.
(2) medium containing galactosidase.
(3) medium containing chromogenic substrate.
(4) tetracycline containing medium.

156. The sequence which is responsible for controlling the copy number of linked DNA in the vector is known as;

(1) recognition site.
(2) selectable marker.
(3) ori site.
(4) palindromic sequence.

157. Select the **incorrect** statement w.r.t. circulatory system of humans.

(1) Chordae tendinae are present in both ventricles of the heart.
(2) The hepatic portal system exists between the digestive tract and the liver.
(3) The heart is myogenic because it is autoregulated by specialized neural tissues.
(4) Stimulation by sympathetic nerve fibres increases heart rate.

158. Out of the following cellular barriers of innate immunity, choose the **odd** one.

(1) PMNL - neutrophils
(2) Monocytes.
(3) Natural killer cells.
(4) Interferons.

159. Which of the following types of helices are predominantly observed in proteins?

(1) Left-handed only
(2) Right-handed only
(3) Both (1) and (2)
(4) Beta-helix

160. In a chemical synapse, when an impulse arrives at the axon terminal, it;

(1) leads to the opening of the calcium channels at the post-synaptic membrane.
(2) stimulates the fusion of synaptic vesicles towards the pre-synaptic membrane.
(3) causes the binding of the neurotransmitter of its receptors on the post-synaptic neuron.
(4) activates the opening of the potassium channels in the axon terminal.

161. Which of the following acts as an agent of natural selection in case of industrial melanism?

(1) Lichens
(2) Moths
(3) Birds
(4) Pollution

162. Which part of the body is most likely to be affected in people suffering from rheumatoid arthritis?

(1) Heart (2) Liver
(3) Kidney (4) Joints

163. Match **List-I** with **List-II** and choose the **correct** option.

List-I		List-II	
(A)	Sertoli cells	(I)	Testicular hormones
(B)	Leydig cells	(II)	External opening of urethra
(C)	Epididymis	(III)	Nutrition to the germ cells
(D)	Urethral meatus	(IV)	Male sex accessory duct

	A	B	C	D
(1)	IV	II	II	I
(2)	III	I	IV	II
(3)	I	II	III	IV
(4)	II	IV	I	III

164. **Assertion (A):** In humans, cortisol suppress immune response.
Reason (R): Cortisol has the ability to produce anti-inflammatory reactions.

(1) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true and **Reason (R)** is false.
(4) **Assertion (A)** is false and **Reason (R)** is true.

165. Which of the following is used to introduce desired genes in dicot plants?

(1) Microinjection
(2) *E. coli*
(3) Retrovirus
(4) *Agrobacterium tumifaciens*

166. Which of the following hormones increase heart beat and strength of heart contraction?

(1) Epinephrine (2) Melatonin
(3) Cortisol (4) Calcitonin

167. Match **List-I** with **List-II** and choose the **correct** option.

List-I (Blood group)		List-II (Antibody in plasma)	
(A)	A	(I)	anti-B
(B)	AB	(II)	anti-A
(C)	O	(III)	Nil
(D)	B	(IV)	anti-A, B

	A	B	C	D
(1)	IV	II	II	I
(2)	I	III	IV	II
(3)	I	II	III	IV
(4)	II	IV	I	III

168. Identify the type of follicle on the basis of presence of given characteristics.

A. Presence of theca externa.
B. Formation of first polar body.
C. Completion of 1st meiotic division.

Select the **correct** option.

(1) Tertiary follicle
(2) Primordial follicle
(3) Secondary follicle
(4) Primary follicle

169. **Statement I:** Though the human heart is auto-excitable, its functions can be moderated by both neural and hormonal mechanisms.
Statement II: Lymph is almost similar to blood except for the protein content and the formed elements.

(1) Statement I and Statement II both are correct.
(2) Statement I is correct but Statement II is incorrect.
(3) Statement I is incorrect but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

170. What do doctors commonly use to induce delivery when necessary?

(1) Progesterone injections
(2) Estrogen injections
(3) Oxytocin injections
(4) Testosterone injections

171. The ureter, blood vessels and nerves enter the kidney in _____ region.

(1) Cortex (2) Calyx
(3) Pelvis (4) Hilum

172. Transgenic animals can be used for all **except**;

(1) Vaccine safety.
(2) Studying human diseases such as cystic fibrosis and Alzheimer's.
(3) Enhancing crop yield and resistance in agriculture.
(4) Study and preparation of biological products.

173. Albumins in plasma are involved in;

(1) coagulation of blood.
(2) carrying urea.
(3) defense mechanisms of the body.
(4) maintaining osmotic balance.

174. **Statement I:** Osteichthyes include both marine and freshwater fishes with a bony endoskeleton.
Statement II: Body of Osteichthyes is streamlined and their mouth is mostly ventral in position.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct but Statement II is incorrect.
(3) Statement I is incorrect but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

175. All of the following hormones are involved in sugar metabolism **except**;
(1) Glucagon (2) Insulin
(3) Aldosterone (4) Cortisol

176. Amoebiasis or amoebic dysentery is caused by;
(1) *Entamoeba histolytica*, a protozoan parasite in the small intestine.
(2) *Escherichia coli*, a protozoan parasite in the small intestine.
(3) *Entamoeba histolytica*, a protozoan parasite in the large intestine.
(4) *Escherichia coli*, a protozoan parasite in the large intestine.

177. Which of the following is **incorrect** regarding frog?
(1) The ovaries are situated near kidneys and there is no functional connection with kidneys.
(2) A pair of oviducts arising from the ovaries opens into the cloaca collectively through bidder's canal.
(3) Fertilisation is external and takes place in water.
(4) Development involves a larval stage called tadpole which undergoes metamorphosis to form the adult.

178. Unipolar neurons are found only in;
(1) early embryos.
(2) olfactory epithelium.
(3) retina of the eye.
(4) spinal cord.

179. Substance '**X**' which converts angiotensinogen to angiotensin I is secreted by;
(1) wall of heart. (2) adrenal cortex.
(3) Liver. (4) JG cells.

180. Choose the **correct** match from the given options.
(1) GEAC - Genetic Ethical Approval committee
(2) Transgenic mice - Used to test vaccine safety
(3) ADA deficiency - Genetically modified RBCs are infused
(4) α-1-antitrypsin - Cystic fibrosis

181. What is the term for the process of introducing foreign DNA into the cells of an organism?
(1) Translation
(2) Transformation
(3) Translocation
(4) Transcription

182. Select the feature from the options given below that is **correct** for alveoli.
(1) Vascularised bag-like structures.
(2) Cells are multi-layered in appearance.
(3) Presence of branched muscle fibres.
(4) Absence of blood vessels and basement membrane.

183. **Assertion (A):** During pregnancy, the level of several hormones like estrogens, progestogens, cortisol, prolactin, thyroxine, etc. are increased several folds in the maternal blood.
Reason (R): Increased production of these hormones is essential for supporting foetal growth, metabolic changes in the mother, and maintenance of pregnancy.
(1) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true and **Reason (R)** is false.
(4) **Assertion (A)** is false and **Reason (R)** is true.

184. **Assertion (A):** The cardiac output of an athlete will be much higher than that of an ordinary man.
Reason (R): Heart beats of a normal individual is less as compared to that of an athlete.
(1) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true and **Reason (R)** is false.
(4) **Assertion (A)** is false and **Reason (R)** is true.

185. Which of the following are joined via cartilages and allows limited movement?
(1) Adjacent vertebra in vertebral column
(2) Humerus and pectoral girdle
(3) Atlas and axis
(4) Skull bones

SECTION- B

186. Which of the following statement is **correct**?
(1) Spermicidal creams, jellies and foams are usually used along with IUDs to increase their contraceptive efficiency.
(2) Tubectomy is an ideal method of contraception to delay pregnancy.
(3) Nirodh is a barrier method which can be used by females.
(4) Oral contraceptive pills alter the quality of cervical mucus to prevent/retard entry of sperms.

187. Read the following statements.
A. Metagenesis is observed in Helminths.
B. Echinoderms are triploblastic and coelomate animals.
C. Round worms have organ-system level of body organization.
D. Comb plates present in ctenophores help in digestion.
E. Water vascular system is characteristic of Echinoderms.
Choose the **correct** answer from the options given below.
(1) A, D and E are correct
(2) B, C and E are correct
(3) C, D and E are correct
(4) A, B and C are correct

188. Read the following statements carefully and choose the option with only **correct** statements.
A. Spermatogonia produce sperm cells by spermatogenesis that begins at puberty.
B. All spermatogonia periodically undergo meiosis.
C. A primary spermatocyte completes first meiotic division during embryonic development.
D. The secondary spermatocytes have only 23 chromosomes.
(1) A and B (2) B and C
(3) C and D (4) A and D

189. **Statement I:** In female cockroach, anterior part of brood contains gonopore, spermathecal pores and phallic gland.
Statement II: In males, genital pouch located at hind end of abdomen contains dorsal anus, ventral male genital pore and gonapophysis.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct but Statement II is incorrect.
(3) Statement I is incorrect but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

190. **Assertion (A):** In autoradiography, the clone having the non-mutated gene will not appear on the photographic film.
Reason (R): The probe lacks complementarity with the mutated gene.
(1) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true and **Reason (R)** is false.
(4) **Assertion (A)** is false and **Reason (R)** is true.

191. In a population that is in Hardy-Weinberg equilibrium, the frequency of a recessive allele for a certain hereditary trait is 0.40. What percentage of the individual in this population would be expected to show the dominant trait?
(1) 48% (2) 64%
(3) 36% (4) 84%

192. Select the option identifying the value of **A** and **B** in mmHg w.r.t to pO_2 and pCO_2 in different parts involved in diffusion.

Respiratory gas	Atmospheric air	Alveoli	Tissues
O_2	159	104	**A**
CO_2	0.3	**B**	45

(1) A - 95, B – 40
(2) A -40, B – 95
(3) A - 40, B – 40
(4) A -45, B – 40

193. **Assertion (A):** A person who has received a cut and is bleeding needs to be given anti-tetanus treatment.
Reason (R): Anti-tetanus injection enables immunity by providing toxins for tetanus.
(1) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true and **Reason (R)** is false.
(4) **Assertion (A)** is false and **Reason (R)** is true.

194. Select the **correct** option w.r.t. the hormone which regulates diurnal rhythm of our body and its source gland respectively.
(1) Growth hormone and hypothalamus.
(2) Oxytocin and hypothalamus.
(3) Thyrocalcitonin and Thyroid gland.
(4) Melatonin and Pineal gland.

195. How many of the following statements are **incorrect?**

A. Lemur and spotted cuscus are examples of adaptive radiation.

B. Pouched mammals of Australia survived because of competition from any other mammals.

C. The first mammals were like shrews.

D. The skull of baby chimpanzee is more like adult human skull than adult chimpanzee skull.

(1) One (2) Three

(3) Two (4) Four

196. **Assertion (A):** Inner part of the cerebral hemisphere is called white matter.

Reason (R): Fibres of the tracts are covered with the myelin sheath, which constitute the inner part of cerebral hemisphere.

(1) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is a correct explanation of **Assertion (A)**.

(2) Both **Assertion (A)** and **Reason (R)** are true but **Reason (R)** is not a correct explanation of **Assertion (A)**.

(3) **Assertion (A)** is true and **Reason (R)** is false.

(4) **Assertion (A)** is false and **Reason (R)** is true.

197. Which of the following options contain polysaccharides only?

(1) Sucrose, glucose and fructose

(2) Maltose, lactose and fructose

(3) Glycogen, sucrose and maltose

(4) Glycogen, cellulose and starch

198. Red muscle fibres differs from white muscle fibres in having;

(1) more sarcoplasmic reticulum.

(2) less myoglobin content.

(3) more number of mitochondria.

(4) high lactic acid due to anaerobic breakdown of glycogen.

199. Select the **incorrect** statement.

(1) An adult human excretes, on an average, 1 to 1.5 litres of urine per day.

(2) ANF mechanism acts as a check on the renin-angiotensin mechanism.

(3) The CNS passes on motor messages to initiate the contraction of smooth muscles of the urinary bladder.

(4) Presence of glucose and ketone bodies in urine are indicative of diabetes insipidus.

200. Colonies of recombinant bacteria appears white and non-recombinant colonies shows blue colour due to;

(1) Presence of α-galactosidase in recombinant bacteria.

(2) Insertional inactivation of β-galactosidase in recombinant bacteria.

(3) Inactivation of β-glycosidase enzyme in recombinant bacteria.

(4) Insertional inactivation of β-galactosidase in non-recombinant bacteria.

■■■

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